

WHAT WE CLAIM IS:

1. A low VOC clear coating composition comprising isocyanate, epoxy compound and melamine components wherein said isocyanate component comprises an aliphatic polyisocyanate having an average of 2 to 6 isocyanate functionalities.

5 2. The composition of claim 1 wherein said composition further comprises a catalyst.

10 3. The composition of claim 2 wherein said catalyst is selected from the group consisting of an organotin catalyst, acid catalyst and combinations thereof.

15 4. The composition of claim 3 wherein said organotin catalyst is selected from the group consisting of dibutyltin diacetate, dibutyltin dilaurate, dibutyltin oxide, dibutyltin bis(acetoacetate) and combinations thereof.

20 5. The composition of claim 3, wherein said acid catalyst is selected from the group consisting of phenyl acid phosphate, butyl acid phosphate, octyl acid phosphate, dodecylbenzenesulfonic acid, para-toluenesulfonic acid, dinonylnaphthalenesulfonic acid and combinations thereof.

25 6. The composition of claim 3 or 5, wherein said acid catalyst is blocked with an amine.

7. The composition of claim 6, wherein said amine is dimethyloxazolidine, 2-amino-2-methyl-1-propanol, di(2-hydroxyethyl)amine or a combination thereof.

30 8. The composition of claim 2,3,4,5 or 6 wherein said composition comprises about 0.001 weight percent to about 3.0 weight percent of catalyst, all percentages based on the total weight of composition solid.

9. The composition of claim 1 further comprises a polyhydroxyl functional compound.

35 10. The composition of claim 9 wherein said polyhydroxyl functional compound is a polycarbonate polyol.

11. The composition of claim 9 or 10 wherein said polyhydroxyl functional compound comprises from about 0.5 weight percent to about 15 weight percent of the composition.

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12. The composition of claim 1 further comprises a non-aqueous dispersion resin, stabilized dispersed polymer particles.

13. The composition of claim 1, wherein said epoxy compound is selected
10 from the group consisting of a polyglycidyl ester of an acid, a polyfunctional aliphatic epoxy compound, a cycloaliphatic epoxy compound, a polyfunctional cycloaliphatic epoxy compound or combinations thereof.

14. The composition of claim 1 or 13, wherein said epoxy compound is a di
15 or polyglycidyl ester of a di or polycarboxylic acid.

15. The composition of claim 1, 13 or 14, wherein said epoxy compound comprises from about 10 weight percent to about 40 weight percent of the composition.

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16. The composition of claim 1, wherein said melamine is a fully alkylated melamine-formaldehyde resin.

17. The composition of claim 1, wherein said melamine is a partially
25 alkylated melamine-formaldehyde resin.

18. The composition of claim 1, 16 or 17, wherein said melamine compound comprises from about 10 weight percent to about 40 weight percent of the composition.

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19. The composition of claim 1 further comprises ultraviolet light absorbers, light stabilizers or a combination thereof.

20. The composition of claim 1, wherein said aliphatic polyisocyanate is
35 selected from the group consisting of trimers of hexamethylene diisocyanate,

isophorone diisocyanate, or meta-tetramethylene diisocyanate and combinations thereof.

21. The composition of claim 1 or 20, wherein said aliphatic polyisocyanate
5 is blocked.

22. The composition of claim 1, 20 or 21, wherein aliphatic polyisocyanate is
blocked by reacting with an aliphatic mono-alcohol.

10 23. The composition of claim 1, 20, 21 or 22, wherein said aliphatic
polyisocyanate comprises from about 35 weight percent to about 70 weight percent of
the composition.

15 24. The composition of claim 1 further comprises a solvent.

25. The composition of claim 1, wherein said composition has a solids
content of greater than 65 weight percent.

20 26. A composition of claim 1, wherein said composition has a solids content
of greater than 80 weight percent.

25 27. An article comprising a substrate having a first and a second major
surface and a layer of protective coating, the protective coating comprising a
hardened composition of claim 1.

28. The article of claim 27, wherein said substrate is selected from the group
consisting of metal, plastic, wood and rubber.

30 29. The article of claim 27, wherein said layer of protective coating has a
thickness of about 25 micrometers to about 75 micrometers.

30 30. The article of claim 27, wherein said layer of protective coating is acid-
resistant.

35 31. The article of claim 27, wherein said layer of protective coating is
transparent.

32. The article of claim 27, comprising a layer of electrocoat, primer and a layer of basecoat interposed between the substrate and the layer of protective coating.

5 33. A process of making a composition that upon hardening forms a protective coating comprising the steps of:

combining an aliphatic polyisocyanate having an average of 2 to 6 isocyanate functionalities an epoxy compound, and melamine.

10 34. A process of making a composition that upon hardening forms a protective coating comprising the steps of:

making a first mixture comprising an epoxy, a melamine;

making a second mixture comprising an aliphatic polyisocyanate

15 having an average of 2 to 6 isocyanate functionalities; and

combining the first and second mixtures

wherein said first mixture, second mixture or both mixtures comprise a solvent.

20 35. The process of claim 34 wherein said first mixture, second mixture or both mixtures contain a solvent.

36. The product produced by the process of claim 34.

25 37. A process of making an article comprising the steps of:

applying a composition comprising an aliphatic polyisocyanate having an average of 2 to 6 isocyanate functionalities, an epoxy compound, and melamine to a substrate; and hardening the composition.

30 38. The process of claim 37 wherein said composition is applied by spraying.